DOCUMENT RESUME

ED 453 219 TM 032 570

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TITLE The Interplay of Ability and Motivational Variables over Time: A 5 Year Longitudinal Study of Predicting College Student Success.
PUB DATE 2001-04-00
NOTE 13p.; Paper presented at the Annual Meeting of the American Educational Research Association (Seattle, WA, April 10-14, 2001).
PUB TYPE Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Ability; *Academic Achievement; *Achievement Need; *College Students; Educational Objectives; Higher Education; Longitudinal Studies; Prediction; Predictor Variables; Psychology; *Student Motivation

ABSTRACT

Researchers conducted a longitudinal study of achievement goals and ability measures to investigate the predictors of academic success over the course of 471 students' college careers. First, researchers examined which variables that were important in predicting students' interest and performance in an introductory psychology course taken in their first semester in college. Then, researchers followed students until they graduated to examine long-term consequences in terms of continued interest in psychology courses and subsequent performance in psychology classes. Achievement goals and ability measures each contributed unique variance in predicting initial and long-term outcomes. Ability measures, however, were only linked to academic performance outcomes, but achievement goal measures were linked to both interest and performance outcomes. The impact of achievement goals, ability, and initial experiences in introductory college courses is discussed. (Contains 1 table, 3 figures, and 11 references.) (Author/SLD)

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The Interplay of Ability and Motivational Variables Over Time: A 5 Year Longitudinal Study of Predicting College Student Success

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TM032570

Poster presented at the 2001 annual meeting of the American Educational Research Association in Seattle, WA

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Abstract

We conducted a longitudinal study of achievement goals and ability measures to investigate the predictors of academic success over the course of students' college careers. First, we examined which variables were important in predicting students' interest and performance in an introductory psychology course taken in their first semester in college. Then, we followed students until they graduated to examine long-term consequences in terms of continued interest in psychology courses and subsequent performance in psychology classes. Achievement goals and ability measures each contributed unique variance in predicting initial and long-term outcomes. Ability measures, however, were only linked to academic performance outcomes, whereas achievement goal measures were linked to both interest and performance outcomes. The impact of achievement goals, ability, and initial experiences in introductory college courses are discussed.

Introduction

What variables are important to consider when trying to predict college students' success? One answer can be found at the admissions office at your university . Although the particular variables and weight given to each may vary from campus to campus, two stand out as key predictors used nationwide. The first involves a standardized measure of students' ability, such as SAT or ACT. The second involves a measure of students' past performance and ability, like high school GPA or high school rank. In each case, both have been positively linked to predicting undergraduate grade point average (Lavin, 1965, Willingham et al., 1990).

A second answer to this question, however, can be provided by theorists who adopt a broader definition of success that includes interest in addition to academic performance outcomes (Maehr, 1976; Nicholls, 1979). These theorists consider the role of motivational variables in promoting both indicators of academic success, and over the last two decades, achievement goal theory has emerged as the predominant framework for understanding students' achievement motivation (Midgley et al., 1998; Pintrich & Schunk, 1996). Achievement goals reflect the purpose of a student's achievement pursuits (Dweck & Leggett, 1988; Nicholls, 1984), and two general types have been proposed: mastery and performance. When pursuing mastery goals, a student's purpose is to develop competence by acquiring new knowledge and skills. When pursuing performance goals, a student's purpose is to demonstrate competence relative to others. Recently, a number of studies in college classrooms have linked both types of achievement goals to important educational outcomes. For example, Elliot and Church (1997) and Harackiewicz et al. (1997, 2000) found that students reporting performance goals in the beginning of the semester were more likely to achieve higher grades at the end of the semester. In contrast, students reporting mastery goals in the beginning of the semester were more likely to report interest in the material at the end of the semester. Thus, it appears that students adopting both types of achievement goals may be most likely to succeed in their coursework.

The goal of the present study was to consider the interplay of both ability and motivational variables in predicting college students' success over their college career. Specifically, will ability and motivational measures contribute independent or interactive effects in predicting success outcomes? Will certain variables be better predictors of success at different points time? Finally, if the definition of success is broadened to include the development of interest in an academic discipline as well as academic performance, which variables will be more important in predicting a particular outcome?

Methods

We followed 471 undergraduate students through their entire college experience at a large, Midwestern university. The initial component of the study (which we will refer to as the

short term) investigated the role of ability and motivational variables in predicting students' success in an introductory psychology class taken in their first semester. We measured students' mastery and performance goals for the class two to three weeks into the semester, and their interest in psychology near the end of the semester (see Table 1 for items). Upon completion of the course, we obtained students SAT or ACT scores (Ability), high school percentile rank (HS Rank), their final grade in introductory psychology (Final Grade), and their overall first semester GPA (Semester GPA) from university records.

Five years later (which we will refer to as the long term), we again obtained their academic records to examine students' subsequent course taking, choice of academic major, and grades over the rest of their undergraduate careers. We counted the number of additional credits taken in psychology courses over their remaining semesters, providing a behavioral measure of subsequent interest in psychology. We also recorded whether students had declared a major, and if so, whether or not they had majored in Psychology (Major in Psych). Finally, to measure subsequent academic performance, we computed a grade point average for all courses taken following the semester of the initial study (Subsequent GPA), and we computed a grade point average for subsequent psychology courses for those students who took additional Psychology classes (Psychology GPA). Of our original sample of 471, 225 students took at least one additional psychology class after their introductory course, averaging 5.32 additional credits.

Results

We conducted an initial series of regression analyses to examine the effects of ability and motivational variables on outcome variables measured during the semester in which students took Introductory Psychology (the short term), and a second series of regressions to examine the effects of ability and motivational variables on measures collected in the 5 year follow-up assessment (the long term). This data analytic strategy allowed us to retain the continuous nature of the variables and to test the independent effects of each predictor variable as well as the interactions between them. Additionally, all main effect terms were standardized, and multiplicative two- and three-way interaction terms were created with these variables. Multiple regression was used for continuous dependent variables and logistic regression for our dichotomous variable (Major in Psych).

To investigate the effects of ability and motivational variables in the short term, Interest, Final Grade, and Semester GPA were each regressed on a basic model that included Ability, HS percentile, Mastery goals, and Performance goals (and all possible interactions between these variables). The significant effects on each of the short term outcomes are summarized in a path diagram in Figure 1.

To investigate the effects of ability and motivational variables in the long term, Courses Taken, Major, Psychology GPA, and Subsequent GPA were regressed on two different models. The first model contained the same basic predictors as above on short term outcomes, and significant effects on each of the long term outcomes are summarized in Figure 2. However, to examine long term effects in the context of the short term effects documented in Figure 1, we evaluated a second model that added Interest and Final grade variables to the basic model. This second model allowed us to test for mediated and/or indirect effects of ability and motivational variables on the long term consequences. In addition, we added the interaction between Interest and Final Grade. Figure 3 summarizes the significant direct, indirect, and mediated effects on the long term outcomes.

Discussion

In the short term, ability and motivational variables both proved to be important in predicting student success outcomes. However, as shown in Figure 1, a different set of predictors emerged depending on whether interest or academic performance was being predicted. When predicting interest, mastery goals emerged as the only significant predictor. Specifically, students who adopted mastery goals at the outset of the class reported greater interest in psychology at the end of their first semester. In contrast, when predicting academic performance, ability, high school percentile, and performance goals all emerged as predictors. Students who had higher SAT/ACT test scores, who had a higher high school percentile rank, and who adopted performance goals for their psychology class obtained higher grades. This pattern occurred on both specific (Final Grade) and general (Semester GPA) measures of academic graded performance. Although ability and high school percentile proved to be the stronger predictors, performance goals contributed additional variance. Interestingly, no interactive effects between ability and motivational variables were revealed on either short term outcome.

Over the long term, ability and motivational variables continued to be important predictors of students' success, and revealed a pattern similar to that found in the short term. As shown in Figure 2, when predicting long term interest outcomes (Courses Taken and Major in Psych), mastery goals again emerged as the only significant predictor. Students who adopted mastery goals for their initial psychology class were more likely to take additional psychology classes over the course of their college careers and were more likely to major in psychology. Similarly, ability, high school percentile, and performance goals continued to positively predict academic performance outcomes. And, once again, no interactive effects between ability and motivational variables were revealed across the long term.

A comparison of the size of the effects in Figures 1 and 2 suggests that the general pattern revealed for motivational variables became weaker over time, whereas ability variables continued to predict academic performance outcomes at a similar magnitude. However, in defense of the motivational variables, the effects of achievement goals adopted at the outset of students' college careers may be better understood in the context of how these initial motivational goals shaped students' short term outcomes and, in turn, how short term outcomes shaped long term outcomes.

Thus, our final set of regressions, shown in Figure 3, evaluated this temporal process by considering long term effects in the context of short term effects. These results revealed that short term outcomes mediated the direct achievement goal effects established in Figure 2. In other words, mastery goals adopted in introductory psychology were significant predictors of reporting interest in psychology at the end of the first semester. Interest was then the more proximal predictor of additional course taking and majoring in psychology. Similarly, performance goals were significant predictors of initial academic success in psychology (Final Grade) and in the first semester of college (Semester GPA). However, final grade and semester GPA were then the more proximal predictors of future academic performance. Only ability and high school percentile continued to exert direct effects on long term outcomes after short term outcomes were controlled. This final analysis also revealed the first interactive effect, which occurred between short term outcomes. Students who were interested in psychology at the end of their first semester and who obtained higher grades were especially likely to take additional courses and to major in this field.

In sum, ability and motivational variables both accounted for unique, independent variance in predicting success outcomes. However, although ability and motivational variables

were both directly linked to academic performance outcomes, only motivational variables were linked to interest outcomes. Thus, while classic ability measures used by admissions offices to predict success were important in predicting grades in both the short and long term, motivational variables were important in allowing us to better understanding why students pursue particular coursework and what may help them sustain their performance over time. By broadening the definition of success to include interest and performance, we were able to develop a much richer understanding of what it means to be successful, both in and out of a given field.

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Table 1. Goal and Interest Items and Scales.

Mastery Goal Scale
1. I want to learn as much as possible in this class.
2. In a class like this, I prefer course material that really challenges me so I can learn new things.
3. The most important thing for me in this course is trying to understand the content as thoroughly as possible.
4. Understanding psychology is important to me.
5. I like it best when something I learn makes me want to find out more.
6. In a class like this, I prefer course material that arouses my curiosity, even if it is difficult to learn.
Performance Goal Scale
1. It is important for me to do better than other students.
2. My goal in this class is to get a better grade than most of the other students.
3. It is important for me to do well compared to others in this class.
4. I want to do well in this class to show my ability to my family, friends, advisors, or others.
5. Getting a good grade in this class is the most important thing for me right now.
6. It is important for me to establish a good overall GPA, so my main concern in this class is getting a good grade.
Interest in Psychology
1. I think the field of psychology is very interesting.
2. I think I will be able to use what I learn in this course in other courses.
3. I would recommend this class to others.
4. I am enjoying this psychology class very much.
5. This class has been a waste of my time (reversed).
6. I think what we are learning in this class is interesting.
7. I'm glad I took this class.
8. I think the course material in this class is useful for me to learn.
9. I would like to take more psychology classes after this one.
10. I am more likely to register for another psychology class because of my experience in introductory psychology.

Figure 1: Path model summarizing effects of ability and motivational variables on short term outcomes. Path coefficients are standardized regression coefficients, and only significant paths at $p<.05$ are represented.

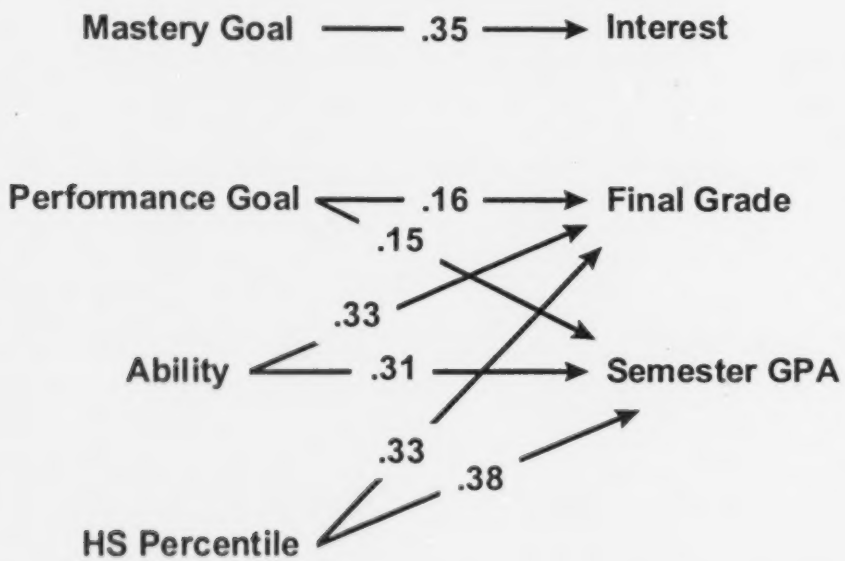

Figure 2: Path model summarizing direct effects of ability and motivational variables on long term outcomes. Path coefficients are standardized regression coefficients. All paths are significant at $p<.05$, except for the dashed path between Performance Goals and Psychology GPA which was marginally significant. This effect is shown because it is similar in magnitude to the Performance Goal effect on Semester GPA, but marginal because it is based on N=225 (for those students who took additional psychology classes) rather than the Semester GPA effect, which is based on N=471.

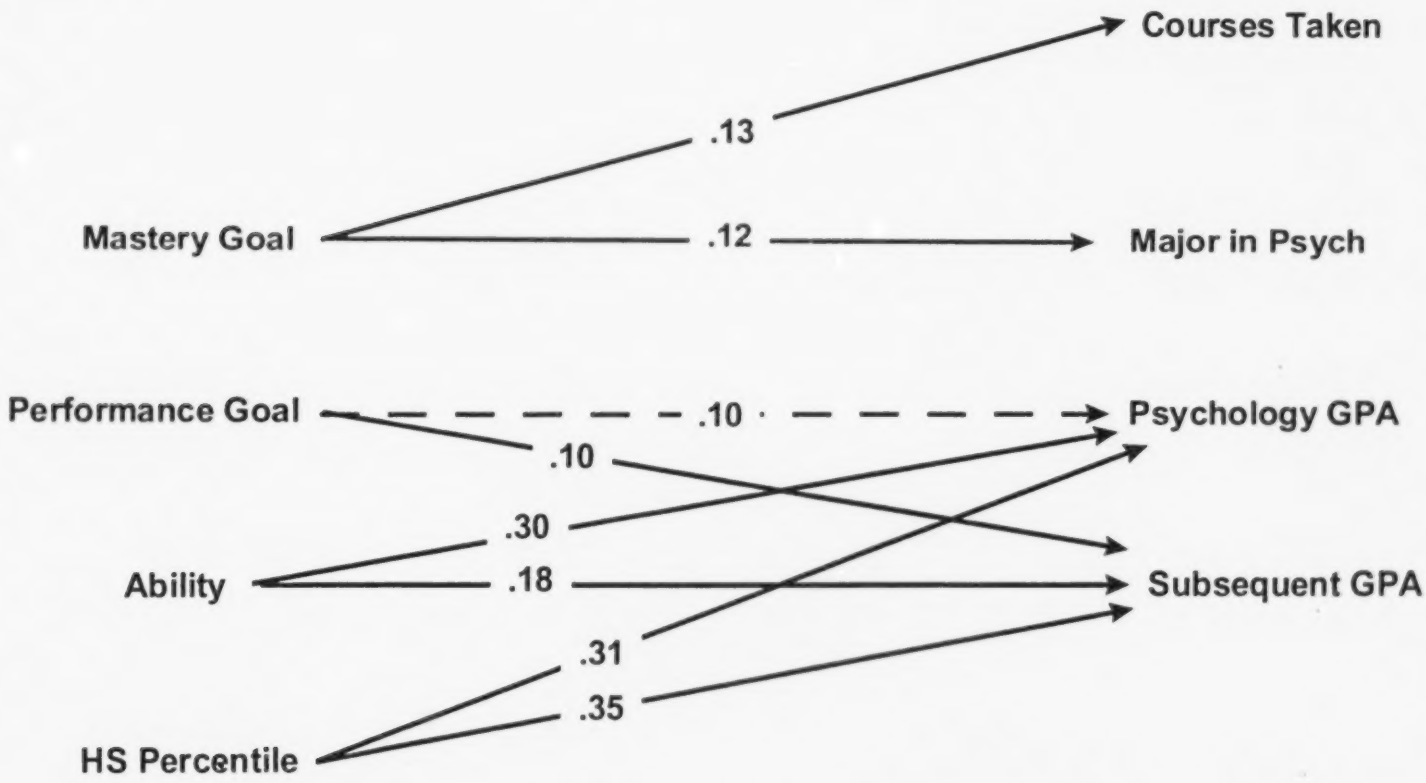

Figure 3: Path model summarizing direct, indirect, and mediated effects on long term outcomes. Path coefficients are standardized regression coefficients, and all paths represented are significant ($p<.05$). A path with two coefficients represents an effect that varies as a function of a significant interaction.